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ORIGINAL

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February 12, 1998

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

Ms. Magalie Roman Salas
Secretary
Federal Communications Commission
1919 M Street, N.W. Room 222
Washington, D.C. 20554

RE: CC Docket Nos. 96-45 and 97-160

Dear Ms. Salas,

Today, representatives of the Benchmark Cost Proxy Model (BCPM) joint sponsors met with James Schlichting, Deputy Chief of the Common Carrier Bureau, to discuss the above referenced proceedings. The attached materials were covered during the meeting. Representing the BCPM joint sponsors were Whit Jordan of Bell South and Brian Staihr and Pete Sywenki of Sprint. Also, attached to this notice is a sensitivity analysis of Hatfield 5.0 using BCPM3 inputs which has been provided to Mr. Schlichting.

Three copies of this notice are being submitted to the Secretary of the FCC in accordance with Section 1.1206(a)(1) of the Commission's rules. If there are any questions, please call.

Sincerely,

Pete Sywenki

Attachment

cc: James Schlichting

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Benchmark Cost Proxy Model BCPM3

Platforms, Issues, Differences:
BCPM3 & Hatfield Model 5.0



WHAT IS THIS PROCEEDING ABOUT?

- Select a Proxy Cost Model Platform.
- Determine Forward-Looking Cost Methodology for an Efficient Network.
- Efficiently Target Support to Rural Customers.
- Meet the Criteria of the 1996 Telcom Act.
- Meet the FCC's Criteria for Proxy Models.
- This Proceeding Is **NOT** About
 - Cost Model Inputs,
 - or the Ultimate Fund Size (Determined by the Inputs).



THE BOTTOM LINE - HOW DO PLATFORM RESULTS COMPARE?

	Dollars - Millions			
	<u>BCPM3</u>		<u>Hatfield 5.0</u>	
	<u>Default</u>	<u>Common</u>	<u>Common</u>	<u>Default</u>
Ameritech	\$ 520	\$ 232	\$ 202	\$ 111
Bell Atlantic	\$ 1,047	\$ 481	\$ 595	\$ 340
Bell South	\$ 1,649	\$ 761	\$ 813	\$ 480
SBC	\$ 1,466	\$ 771	\$ 619	\$ 407
US WEST	\$ 1,225	\$ 726	\$ 629	\$ 425
Sprint	\$ 823	\$ 368	\$ 398	\$ 240
	\$ 6,730	\$ 3,339	\$ 3,256	\$ 2,003

SUMMARY

- In aggregate, with common inputs, the models produce similar results.
- At lower levels there are significant differences in results.
- The real differences between the models include:
 - The accuracy of customer location,
 - The availability of customer location data,
 - The technology used in the models.

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CUSTOMER LOCATION

- The Commission Has Said:

- *At this point we conclude that we should not select one model over another because both models lack a compelling design algorithm that specifies where within a CBG customers are located... (5/8/97 Order at 278)*

- The Facts Are These:

FACT: Hatfield 5.0 contains NO design algorithm that specifies where within the basic unit of analysis customers are located.

FACT: The much touted “geocoding” of customers is only used to identify the boundary of “clusters” of customers. Once clusters are created, this information is not used again, and customers are assumed to be uniformly distributed throughout the cluster.

FACT: Thousands of clusters nationwide are 10, 15, 20 square miles in area or more. Hatfield 5.0 contains NO methods for locating customers within these large land areas. Many populated areas are not included.

FACT: BCPM contains extensive algorithms for locating customers within “grids”. Grids are all less than 9 square miles, all are subdivided into quadrants, unpopulated areas are eliminated, distribution areas centered over road (population) centroids, sized to reflect population, etc.

FACT: Ironically, if accurate geocoded information were to become available it would not improve the network design accuracy of Hatfield 5.0 due to the uniform distribution assumptions. BCPM could use such data to more accurately build the network to where customers actually are located



CUSTOMER LOCATION

(CONTINUED)

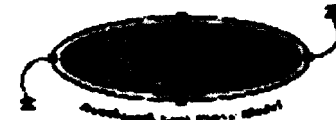
- The Commission Has Said:

- *The cost study or model and all underlying data, formulae, computations, and the software associated with the model must be available to all interested parties for review and comment... (5/8/97 Order at 250)*

- The Facts Are These:

FACT: The raw data used by Hatfield for geocoding is proprietary, expensive, and only locates a small fraction of customers in high-cost rural areas.

FACT: All BCPM algorithms and data are public and have been provided on the record.



TECHNICAL SPECIFICATIONS

- Congress and the Commission have said:
 - *Consumers in all regions of the Nation, including low-income consumers and those in rural, insular, and high cost areas, should have access to telecommunications and information services, including interexchange services and advanced telecommunications and information services, that are reasonable comparable to those services that are provided in urban areas... (1996 Act Section 254(b)(3))*
 - *The technology assumed in the cost study or model must be the least-cost, most-efficient, and reasonable technology for providing the supported services... The loop design incorporated into a forward-looking economic cost study or model should not impede the provision of advanced services. (5/8/97 Order at 250)*
- The Facts Are These:
 - **FACT:** The BCPM3 uses a standard and state-of-the-art CSA network architecture. The Hatfield 5.0 uses a non-standard network design which regularly provides copper loops of 18,000 feet or more.
 - **FACT:** The major manufacturer of Digital Loop Carrier endorses the design architecture used by BCPM3.
CSA design rules call for nonloaded pairs with a maximum physical range of 12,000 feet or 750 ohms conductor loop resistance, whichever occurs first. In the case of 26-gauge wire, this equates to a maximum loop range or 9,000 feet. Today the CSA design rules ensure quality 2-wire voice transmission and the capability to support advanced digital services, including repeaterless digital data service (DDS), ISDN basic rate transmission (2B+D), high-bit-rate digital subscriber line (HDSL). (DSC Litespan Practice OSP 363-20-010 Issue 6, July 1997 at 5.3.1)



TECHNICAL SPECIFICATIONS

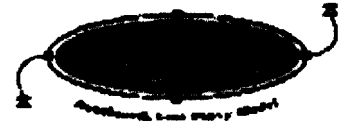
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FACT: DSC provides special equipment for situations where copper loop length exceeds the CSA standards. BCPM incorporates this (added cost) equipment in the rare cases where we exceed CSA standards. Hatfield 5.0 does not, even though it uses an 18,000 foot design "standard".

There are applications of the Litespan system where it is necessary to serve customers more distant than 12,000 feet (beyond CSA rules) from the RT. The insertion loss at 1 kHz for extended CSA/CDO length loops exceeds common practice and approaches 10 dB, including a 2-dB loss in the Litespan RPOTS channel unit. It is strongly recommended, therefore, that RUVG2 or REUVG channel units be used in any Litespan RT that may be serving any loops longer than 750 ohms. (DSC Litespan Practice OSP 363-20-010 Issue 6, July 1997 at 5.3.2)

FACT: A recent Bellcore study has found that when copper loops exceed 9,000 feet, the ability to support a 28.8 Kbps modem speed deteriorates dramatically:

To achieve a 28.8 Kbps connection on the Public Switched Telephone Network (PSTN), three conditions would always need to be met. One and two are non-loaded cables at both ends of the connection with a length of no more than 9 Kft. The third condition is only one A/D and D/A conversion on the connection. (Guidelines for High Speed Analog Data Transmission in the Switched Network, TM-25704, December, 1996)



SOME INACCURATE CRITICISMS OF BCPM

- **BCPM Does Not Compute Costs for Unbundled Network Elements.**
 - **FACT: BCPM Computes Costs for ALL Network Elements**
 - **FACT: BCPM Reporting Module can be programmed to display UNE Costs.**
- **BCPM Does Not Use Geocoded Locations.**
 - **FACT: BCPM Uses Geocoded Locations for Roads.**
 - **FACT: BCPM Uses Publicly Available Customer Location Data at the Census Block Level to Place Customers Along Roads Within “Grid-Cells”. Customers Live Along Roads.**
 - **FACT: BCPM Methodology Is Many Times More Granular and Accurate Than the Hatfield Methodology.**
- **BCPM Uses Proprietary Data From the SCIS Model.**
 - **FACT: BCPM Does Not Include Any Portion of SCIS.**
 - **FACT: All Switching Cost Inputs Are Adjustable by the User.**
 - **FACT: While SCIS Was Used in the Development of the Default Values Used by the BCPM Sponsors, Any Other Source (e.g., Dr. Gable’s Study) Can Be Used As Input.**
 - **BCPM does not accurately estimate lines per serving area.**
 - **FACT: BCPM is designed to use actual line counts obtained from LECs to build appropriate network, consistent with the May 8th Order.**



CONCLUSIONS

- Hatfield 5.0 Fails to Meet Many of the FCC Criteria for Proxy Models, and Congressional Criteria for Network Design.
- BCPM More Accurately Locates Customers and Designs a Superior Least-Cost Forward-Looking Network.
- The FCC Should Select BCPM as the Model Platform for the Next Phase of its Inquiry Regarding Data Inputs.



CRITERIA FROM THE 1996 ACT

1996 ACT CRITERIA	BCPM3	HATFIELD 5.0
Sec. 254(b)(1) Quality services should be available at just, reasonable and affordable rates.	YES	<ul style="list-style-type: none">• Builds only to current customers, and ignores need to serve new customers.• Sub-standard network design for voice and data services.
Sec. 254(b)(2) Access to advanced telecommunications and information services should be provided in all regions of the Nation.	YES	<ul style="list-style-type: none">• Not capable of delivering 28.8 bps modem service and other advanced services to all customers.
Sec. 254(b)(3) Consumers in all regions of the Nation should have access to services that are reasonably comparable to those provided in urban areas, at reasonably comparable rates.	YES	<ul style="list-style-type: none">• Remote rural customers will not have comparable service due to non-standard network design.
Sec. 254(b)(5) There should be specific, predictable and sufficient mechanisms to preserve and advance universal service.	YES	<ul style="list-style-type: none">• Unrealistic "structure sharing" assumptions will result in insufficient funding in high-cost rural areas.

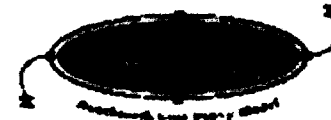
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THE FCC's MODEL CRITERIA

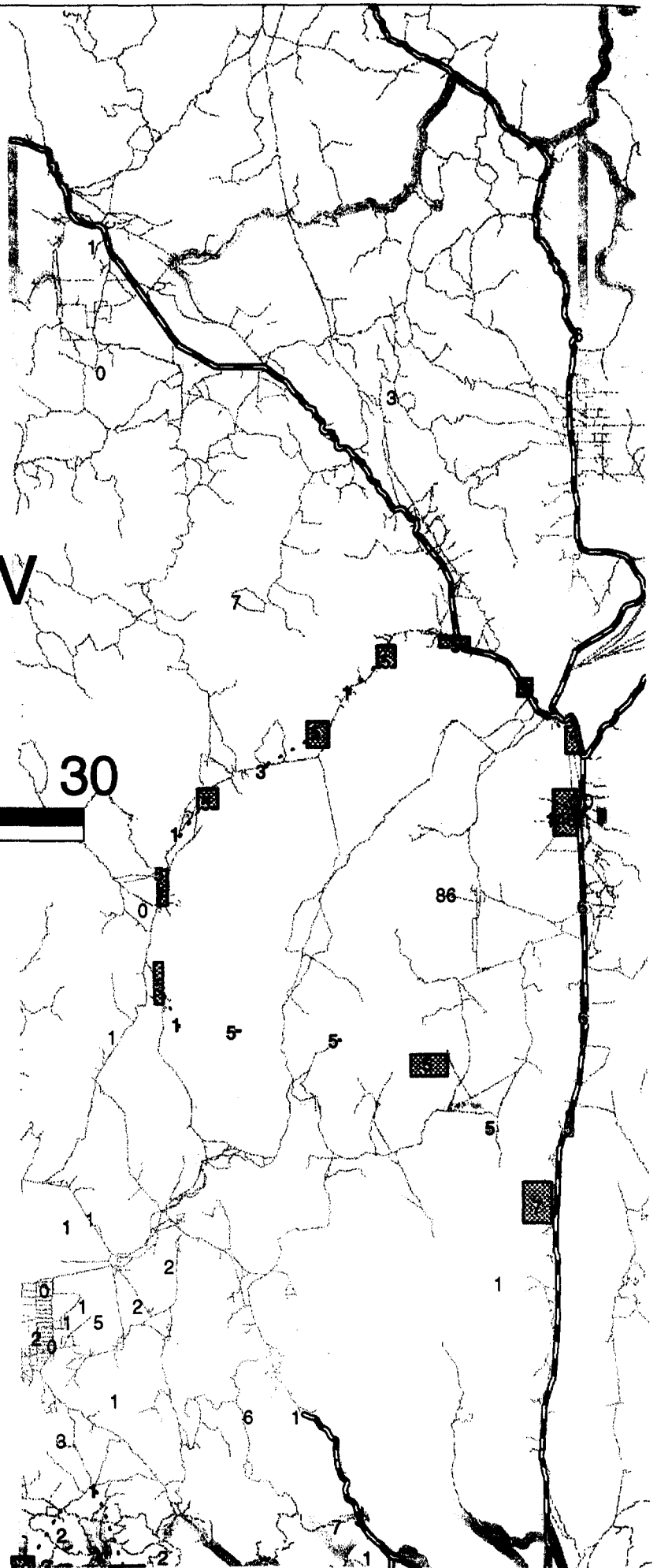
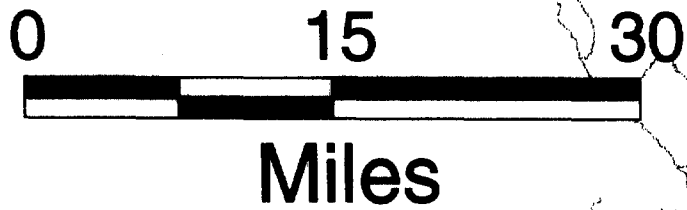
FCC CRITERIA	BCPM3	HATFIELD 5.0
1. The technology must be least cost, most efficient and should not impede the provision of advanced services.	YES	<ul style="list-style-type: none"> Not capable of providing 28.8 bps modem speeds. Not consistent with generally accepted network design standards.
2. All network functions must have an associated cost.	YES	YES
3. Only long-run forward-looking costs may be included.	YES	YES
4. Rate of return must be current FCC or State prescribed.	YES (To be further developed in Phase II)	YES (To be further developed in Phase II)
5. Depreciation rates must be within FCC-authorized range.	YES (To be further developed in Phase II)	YES (To be further developed in Phase II)
6. Must include cost of serving all businesses and households.	YES	YES
7. Reasonable allocation of joint and common costs.	YES (To be further developed in Phase II)	YES (To be further developed in Phase II)
8. The model and all underlying data, formulae, computations and software must be available to all interested parties. All data must be verifiable, engineering assumptions reasonable, and outputs plausible	YES	<ul style="list-style-type: none"> METROMAIL data is proprietary. Algorithm for converting METROMAIL data to geocoded points is proprietary. Network engineering not standard. Shifts more funds to densely populated areas.
9. Must be able to modify critical assumptions and engineering principles.	YES	YES
10. Must deaverage support to the wire center, and if possible, to the CBG, CB or grid cell.	YES	<ul style="list-style-type: none"> Support only stated at wire center and density zone levels.

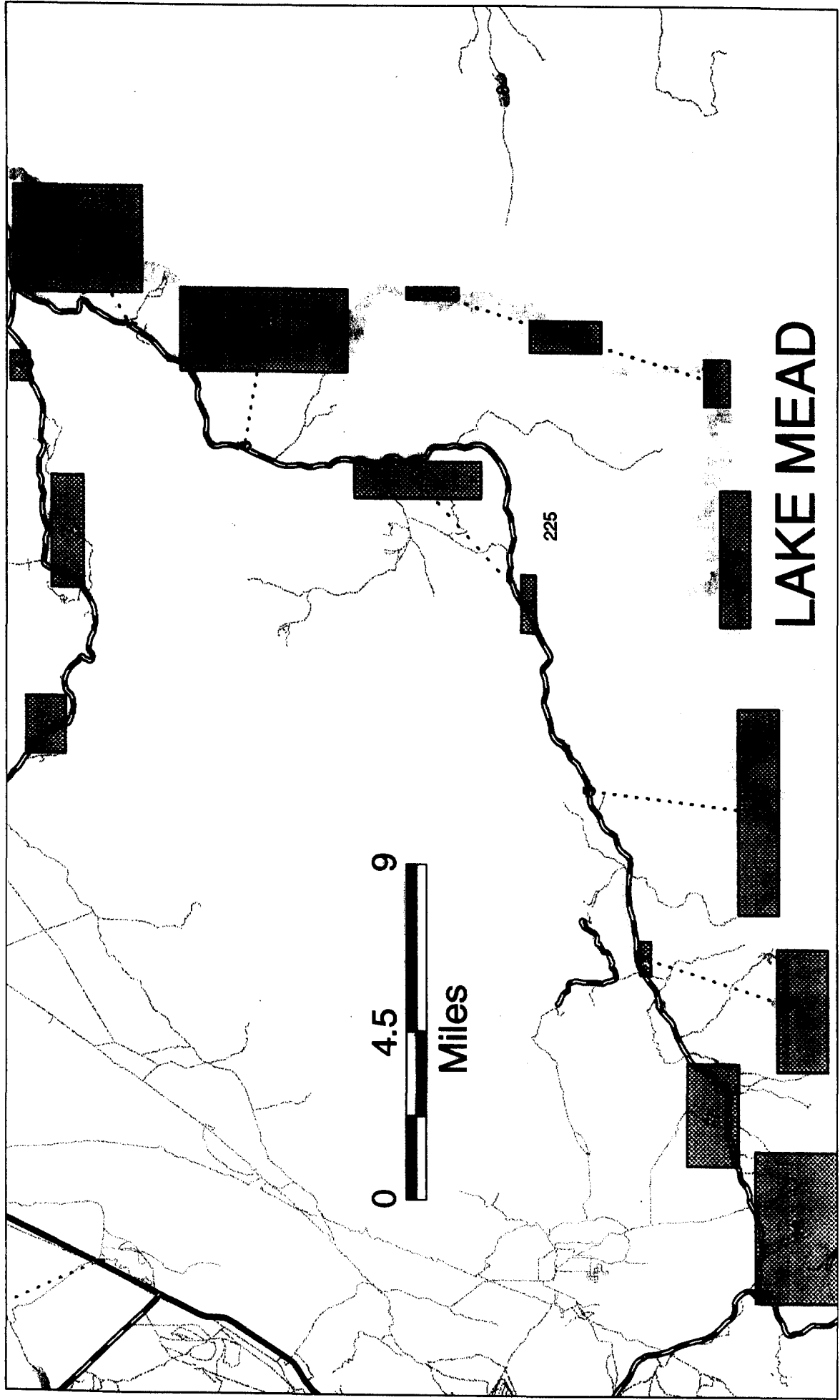
GEOCODE SUCCESS RATES

DENSITY ZONES

	AL	AR	AZ	CA	CO	CT	DC	DE	FL	GA	HI	IA	ID	IL	IN	KS	KY	LA
0	7%	6%	18%	32%	46%			23%	34%	8%	19%	23%	24%	8%	12%	9%	21%	14%
5	41%	37%	61%	62%	62%	83%	100%	43%	62%	44%	41%	43%	53%	37%	38%	47%	41%	47%
100	70%	69%	70%	68%	74%	90%	100%	56%	80%	82%	59%	68%	65%	71%	69%	67%	69%	73%
200	80%	82%	80%	75%	83%	94%	100%	79%	85%	87%	58%	76%	76%	80%	80%	72%	81%	83%
650	89%	88%	87%	76%	84%	95%	88%	81%	84%	91%	53%	84%	72%	80%	80%	78%	88%	89%
850	89%	86%	85%	75%	86%	93%	91%	88%	78%	88%	67%	84%	80%	84%	83%	79%	89%	91%
2550	83%	81%	81%	71%	85%	91%	92%	84%	64%	84%	62%	84%	82%	82%	81%	75%	85%	92%
5000	77%	83%	76%	59%	81%	83%	80%	78%	46%	82%	64%	79%	74%	76%	75%	77%	80%	89%
10000	98%	77%	71%	45%	79%	74%	85%	68%	50%	78%	47%	81%	69%	70%	76%	87%	63%	79%
Avg	65%	60%	77%	65%	80%	90%	85%	73%	70%	75%	56%	66%	67%	73%	70%	65%	66%	76%
	MA	MD	ME	MI	MN	MO	MS	MT	NC	ND	NE	NH	NJ	NM	NV	NY	OH	OK
0	25%	38%	0%	31%	8%	3%	8%	18%	12%	5%	1%	4%	25%	9%	35%	9%	32%	1%
5	65%	62%	16%	73%	44%	26%	26%	53%	34%	31%	35%	26%	60%	46%	57%	35%	64%	23%
100	86%	78%	66%	77%	77%	59%	68%	56%	63%	63%	73%	67%	76%	58%	87%	63%	80%	57%
200	91%	83%	80%	81%	84%	75%	78%	75%	73%	83%	83%	76%	87%	73%	88%	81%	87%	73%
650	93%	87%	89%	84%	88%	81%	87%	86%	81%	99%	86%	85%	94%	80%	90%	89%	91%	77%
850	94%	89%	93%	85%	91%	84%	90%	78%	80%	96%	88%	86%	91%	85%	76%	92%	89%	73%
2550	90%	82%	90%	84%	92%	87%	84%	83%	77%	97%	84%	87%	89%	87%	75%	92%	89%	65%
5000	84%	77%	88%	80%	91%	83%	61%	70%	72%	90%	81%	88%	82%	81%	57%	87%	84%	76%
10000	80%	71%	86%	76%	87%	80%	83%	65%	78%	82%	74%	78%	69%	85%	43%	68%	78%	62%
Avg	87%	80%	49%	81%	76%	66%	56%	61%	62%	64%	65%	65%	84%	69%	68%	74%	83%	54%
	OR	PA	RI	SC	SD	TN	TX	UT	VA	VT	WA	WI	WV	WY	National			
0	31%	1%	100%	28%	5%	14%	7%	24%	10%	0%	29%	35%	1%	34%	15%			
5	50%	26%	76%	53%	41%	46%	32%	54%	25%	8%	51%	54%	11%	48%	43%			
100	45%	58%	91%	78%	69%	71%	63%	61%	84%	35%	54%	70%	40%	67%	69%			
200	51%	76%	92%	83%	84%	83%	76%	71%	78%	53%	60%	78%	61%	86%	79%			
650	50%	83%	92%	86%	100%	87%	84%	82%	85%	75%	61%	84%	79%	80%	84%			
850	44%	85%	91%	82%	86%	89%	87%	82%	88%	82%	62%	87%	88%	84%	84%			
2550	31%	84%	89%	81%	78%	90%	85%	82%	84%	88%	63%	87%	92%	77%	80%			
5000	16%	82%	84%	77%	68%	82%	71%	78%	80%	78%	63%	87%	88%	65%	72%			
10000	18%	87%	79%	83%	61%	79%	70%	83%	75%	83%	75%	84%	75%	95%	66%			
Avg	40%	72%	88%	72%	54%	73%	73%	74%	68%	35%	60%	75%	43%	68%	71%			

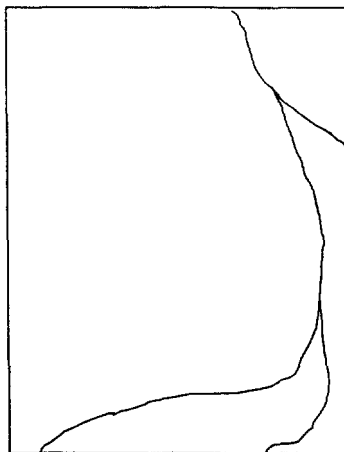
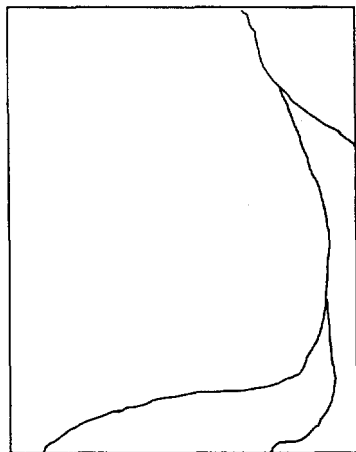
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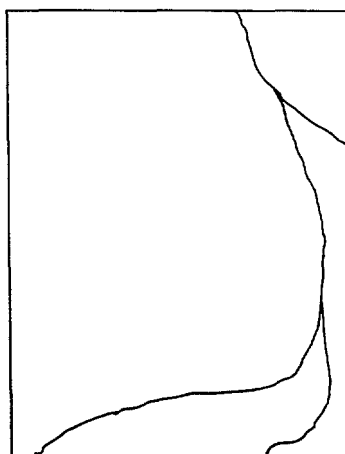
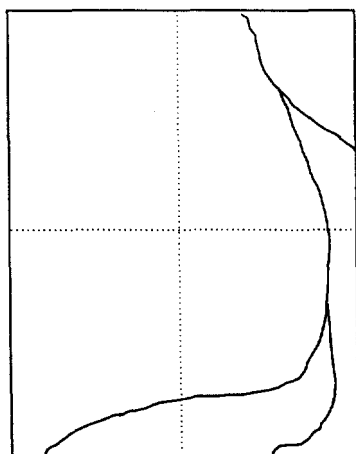
BCPM 3 Grid

Hatfield 5.0 Cluster

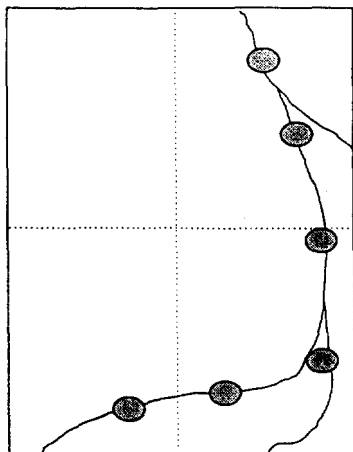


BCPM 3 Grid

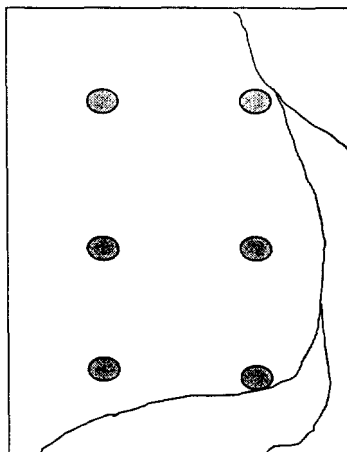
Hatfield 5.0 Cluster



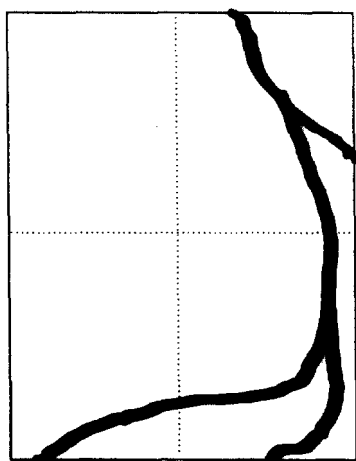
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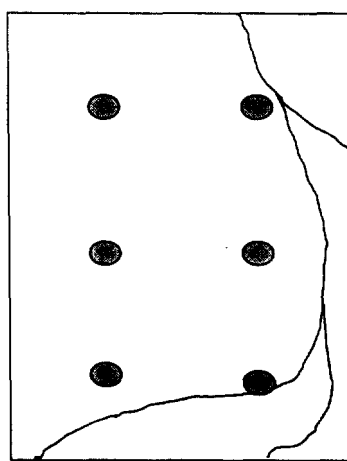
Hatfield 5.0 Cluster



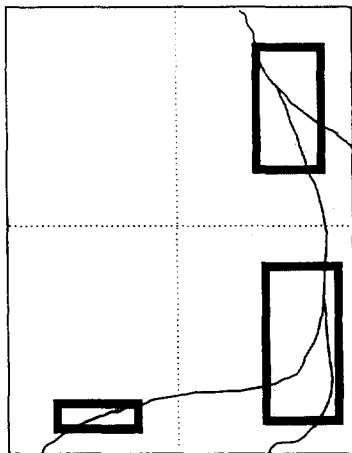
BCPM 3 Grid



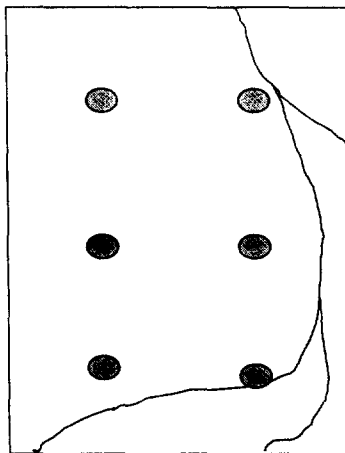
Hatfield 5.0 Cluster



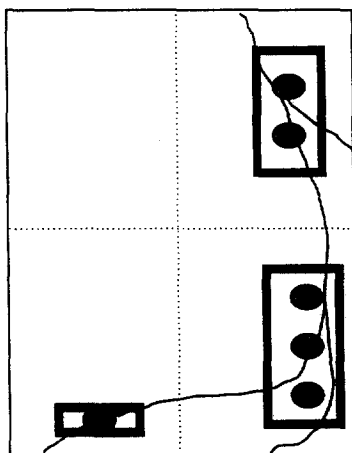
BCPM 3 Grid



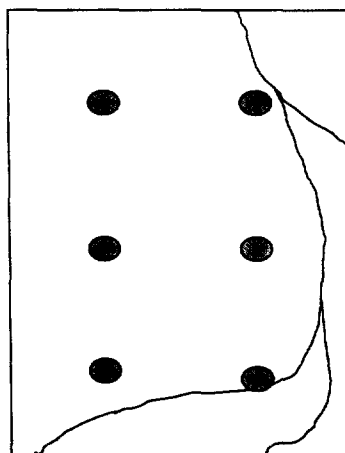
Hatfield 5.0 Cluster



BCPM 3 Grid



Hatfield 5.0 Cluster



Sensitivity Analysis of Hatfield 5.0
Using BCPM3 Inputs for
North Carolina

Analysis was conducted to determine how changing certain User Adjustable Inputs would impact the cost estimates produced by the Hatfield Model 5.0 (Hatfield). The goal was to determine which inputs could be changed to produce costs similar to those produced by the BCPM3 Model. The combined effects of the input changes are compared to the results of the BCPM3 Model using company specific inputs and to the Hatfield default scenario.

For this analysis, the Hatfield and BCPM models were run for Carolina Telephone & Telegraph (CT&T). While the Hatfield Model allows for batch processing of multiple companies, the results are still presented on a per company basis. Therefore, we were not able to compare Sprint's combined CT&T and Centel properties. The results of the analysis are presented below. To summarize:

- User Adjustable Inputs that had significant effects on costs are **Structure Sharing, the Cost of Capital, Fill Factors and Cable Costs** (see analysis below).
- User Adjustable Inputs that did NOT account for significant cost differences include **Plant Mix and Economic Lives & Salvage** (see below).

Below, we outline the quantitative impact of changing key inputs. The magnitude of the change is determined by comparing to the output of the Hatfield scenario that uses all Hatfield input values for the user adjustable inputs. To obtain the results, we inserted the CT&T company specific inputs from BCPM3 into the Hatfield Model.

For example, the CT&T cost of capital in the BCPM is 11.25%, made up of these components:

Cost of Debt	Debt to Capitalization	Debt to Capitalization	Cost of Capital
6.4%	14.1%	37.1%	11.25%

The cost of capital in the Hatfield Model is 10.01%, made up of these components:

Cost of Debt	Debt to Capitalization	Debt to Capitalization	Cost of Capital
11.9%	7.7%	45.0%	10.01%

We inserted four CT&T BCPM values into Hatfield and ran the model for the area served by CT&T in North Carolina to determine the effect of the input change. This process was done for the following inputs:

- Cost of Capital
- Structure Sharing (portions of structures assigned to telephony)
- Economic Lives & Salvage (Depreciation Lives)
- Plant Mix (combination of Buried/Aerial/Underground Plant)
- Cable Fill Factors
- Cable Costs

and a combination of all of the above. The results are shown in the tables below.

First, these are the costs as estimated by the Hatfield 5.0 using Hatfield inputs and BCPM3 using CT&T specific inputs.

Hatfield 5.0 Model All Hatfield Input Values		
Average of All Areas	Lowest Density Area	Highest Density Area *
\$32.01	\$103.21	\$11.97

BCPM3 Model All BCPM Input Values		
Average of All Areas	Lowest Density Area	Highest Density Area *
\$43.58	\$226.57	\$21.38

Note: The Hatfield 5.0 Model does not assign any CT&T lines to the > 10,000 density group, while BCPM3 places 7,252 lines into that group. Therefore, for purposes of comparison the results shown as Highest Density Area are for the 5,001 to 10,000 density group for both models.

The first sensitivity performed was to change the **Cost of Capital** to the BCPM CT&T values, as shown above.

Hatfield 5.0 Model All Hatfield Input Values BCPM Cost of Capital		
Average of All Areas	Lowest Density Area	Highest Density Area
\$34.45	\$111.23	\$12.87

On average, changing Cost of Capital increased costs 7.6% in the Hatfield Model.

Second sensitivity, changing the **Economic Lives & Salvage** per expense category used in converting investment dollars to monthly costs.

Table 10.10 Economic Lives & Salvage		
Average of All Areas	Lowest Density Area	Highest Density Area
\$32.93	\$105.51	\$12.64

On average, changing the Economic Lives increased costs 2.9% in the Hatfield Model.

Third sensitivity, changing the **amount of Structure Sharing** among plant; that is, the percentage of aerial, buried and underground feeder and distribution (as well as poles, etc.) that is allocated to telephony (as opposed to the provision of other services such as cable t.v.).

Table 10.11 All Plant Services Shared Structure BCFM Structure Sharing		
Average of All Areas	Lowest Density Area	Highest Density Area
\$37.10	\$119.77	\$13.49

On average, changing the Structure Sharing increased costs 15.9% in the Hatfield Model.

Fourth sensitivity, changing the **Plant Mix**: the various percentages of aerial vs. buried vs. underground plant built in each density zone, as well as eliminating any assumed shift of one type of plant to another.

Table 10.12 Plant Mix BCFM Plant Mix		
Average of All Areas	Lowest Density Area	Highest Density Area
\$31.87	\$101.81	\$13.87

On average, changing the Plant Mix decreased costs less than one half of 1% in the Hatfield Model. [Note: This was the first input change to actually decrease costs in the Hatfield Model, although the magnitude of the decrease is negligible.]

Fifth sensitivity, changing the **Cable Fill Factors** for distribution and copper feeder cables. Both Models assume that there is a 100% fill for fiber feeder cable in each of the models.

Cable Fill Factors		
BCPM Fill Factors		
Average of All Areas	Lowest Density Area	Highest Density Area
\$30.00	\$98.61	\$11.88

On average, changing the Fill Factors decreased costs by 6.3% in the Hatfield Model. It is possible that this result is driven by the fact that the Hatfield Model applies fill factors to lines while the BCPM applies fill factors to cable pairs.

Sixth Sensitivity, changing the **Cable Costs** for copper and fiber cable. It was not possible to make a perfect and exact exchange (BCPM values for Hatfield values) because the Hatfield Model uses a base cable cost for all types of installations then applies factors to that cost to account for special circumstances such as jacketing.

Cable Costs		
BCPM Cable Costs		
Average of All Areas	Lowest Density Areas	Highest Density Areas
\$34.40	\$120.33	\$11.92

On average, the effect of changing these four inputs increased costs 7.5% in the Hatfield Model.

To see the cumulative effect of these input changes, we changed all the inputs as above in a single run of the Hatfield 5.0 Model. The cumulative result of these input changes is then compared to the run of Hatfield 5.0 using all Hatfield input values:

Cumulative Effect of Input Changes		
All Hatfield Input Values		
Average of All Areas	Lowest Density Areas	Highest Density Areas
\$32.01	\$103.21	\$11.97

Cumulative Effect of Changing Six Inputs		
Average of All Areas	Lowest Density Areas	Highest Density Areas
\$42.42	\$146.66	\$21.44

On average, the cumulative effect of changing these six inputs increased costs 32.5% in the Hatfield Model. The dollar value of the increase, on average, is \$10.41.

It is interesting to compare the results of this cumulative run with the results of BCPM3 using CT&T specific input values. On average, and in the higher density areas, the changes to these inputs bring the Hatfield results more in line with the BCPM estimates. However, in the lowest density areas where universal service support is most important, while the changes to these inputs move the Hatfield results closer to BCPM but there is still a significant difference.

BCPM3 Using CT&T Specific Input Values		
Average of All Areas	Lowest Density Area	Highest Density Area
\$43.58	\$226.57	\$21.38
Hatfield Model Using BCPM3 Values for Capital Costs, Labor Costs, Structure Sharing, Plant Backfill Factors, And Cable Costs		
Average of All Areas	Lowest Density Areas	Highest Density Areas
\$42.42	\$146.66	\$21.44

The discrepancy in the Lower Density areas is due to the fact that the Hatfield Model builds substantially less plant to serve customers in these areas than does the BCPM Model. Additionally, with BCPM3, many of the CT&T specific expense inputs are expressed as percentage of investment similar to the way in which the Hatfield Model applies expense factors. Therefore, the lower investment in the Low Density areas produces a lower cost per line in these areas.

The investment difference between Hatfield and BCPM in the low density rural areas is attributable to the process by which each model establishes customer location. Hatfield uses a cluster process while BCPM uses grids. The design of the clusters/grids, as well as the placement of customers within the clusters/grids, determines the type and amount of plant that will be built to serve customers.

Conclusion:

The two models are fundamentally different in the way they locate customers, which in turn affects the way each model constructs its network. The above analysis shows that changes to standard User Adjustable Inputs (such as Cost of Capital and Cable Costs) will cause the two models to produce similar results on average, and within the higher density areas. However, in the lowest density areas of North Carolina the Input changes will move the cost per line produced by Hatfield toward that produced by BCPM, but the fundamental way in which rural customers are clustered and located still causes a substantial variance in results.